

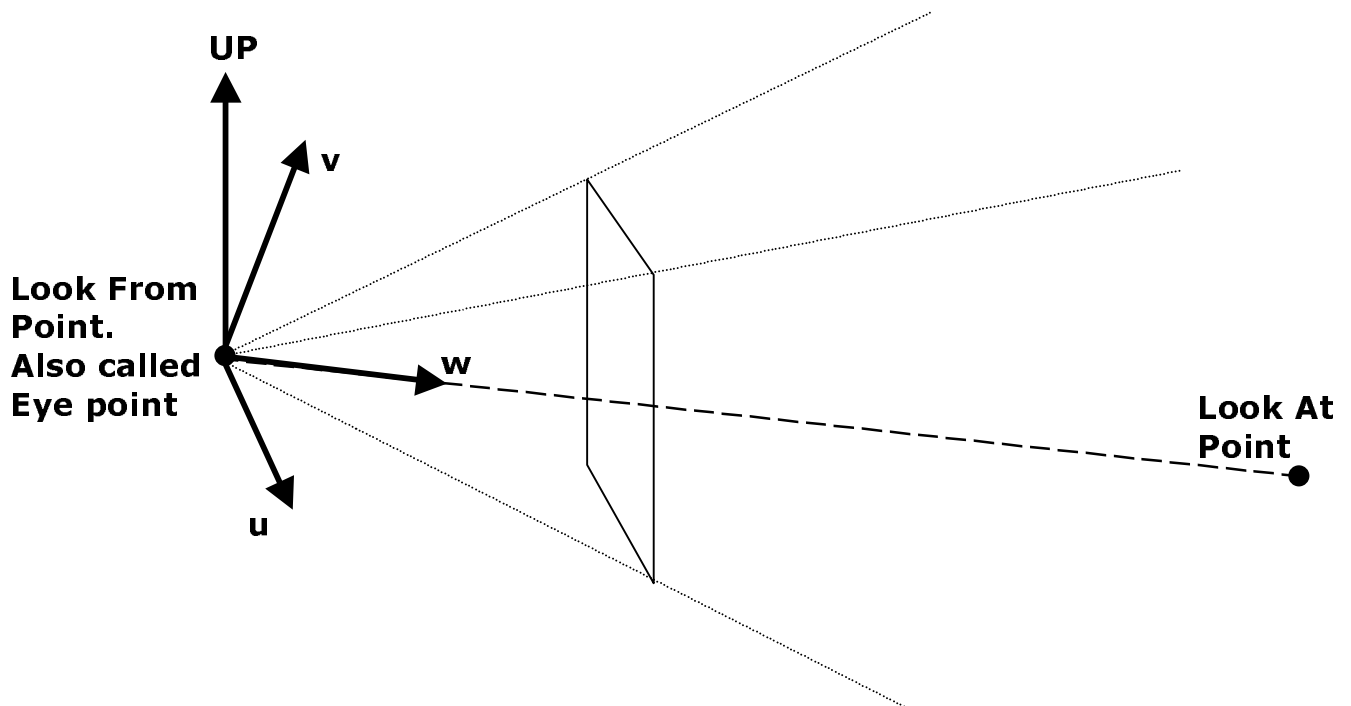
Perspective Transformations

Viewing system matrix \mathbf{M}_{sys} transform is obtained by combining the view matrix with the perspective projection with the viewport to screen matrix. These are defined as:

$$\mathbf{M}_{\text{sys}} = \mathbf{M}_{\text{screen}} \mathbf{M}_{\text{perspective}} \mathbf{M}_{\text{view}}$$

View Matrix

We want to compute the view matrix that aligns the orthonormal basis at the origin and pointing down either the +Z (right-handed) or -Z (left-handed). Here's the picture:



To form the view transform, the axes for the coordinate system of are given by (for right hand system):

$$W = \frac{\text{eye} - \text{at}}{\|\text{eye} - \text{at}\|}$$

$$U = \frac{\text{up} \times w}{\|\text{up} \times w\|}$$

$$V = \frac{w \times u}{\|w \times u\|}$$

For a left-handed system:

$$W = \frac{\text{at} - \text{eye}}{\|\text{at} - \text{eye}\|}$$

$$U = \frac{\text{up} \times w}{\|\text{up} \times w\|}$$

$$V = \frac{u \times w}{\|u \times w\|}$$